

Re-print

Work Order ID 83699

83699

Page 1

May 29, 2012 7:57:21 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12 Start Qty: 1.00

1

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan: CD

Date: 12/05/29 Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start *NR1*

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D350-748-241

F

100

0.00

100

DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-201

CHG002

110

0.00

110

BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT

120

QC15- Crosstube Dimensional Check

0.00

120

QC

Memo

0.00

Quality Control

Issue P/O to Metcor P/O: 16942 CD 12/06/04

12-5-10

Rec'd inspect attached c of c to w/o

44/1/15

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

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Stop *NR2*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
125		0.00							
125									
HandFXtube	Memo	0.00							
Hand Finishing Crosstubes	***Stress relief*** Heat treat crosstube as per QSI010 4.3 Temp: _____ Start time: _____ Finish time: _____	see pg 1							
127	QC5- Inspect part completeness to step on W/O	0.00							
127									
QC	Memo	0.00							
Quality Control									

12-8-17

Srlo/17

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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Reference:

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Run Start ***NR1***

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Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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130

0.00

130

Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-241

4-Remove all marks from tube within limits of D350-748-241

5- Apply a light coat of LPS3 on the interior of tube

Batch: 12/5/30

140

QC6- Inspect dimensions to drawing

0.00

140

QC

Memo

0.00

Quality Control

MO

12-5-23

8 12/5/30

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Stop ***NR2***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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150

Outsource process-Cadplate per QSI017 4.1.9.1

0.00

150

Outsource3

Outsource process - Cad plate

Memo

Issue P/O: 17084
Stress relief at 375° for 5 hours
Magnetic Particle Inspect per ASTM E1444
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375° for 8 hours, Chromate Treat
Possible Supplier: Southwest United Industries
Ensure Certificate of Conformity is attached

0.00

CL 12/06/09 ①

160

Receive & Inspect for Damage & Mat'l Certs

0.00

160

Packaging

Packaging

Memo

Ensure certificate of conformity is attached

0.00

★ SEE W/O 17084 ATTACHED

[Signature]

170

QC5- Inspect part completeness to step on W/O

0.00

170

QC

Quality Control

Memo

0.00

Sublet

WDT

P/O: 17258

CL 12/06/19 X1

acd

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DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.13	161	LOAD TUBE TO 3000 ^{lb} FOR 1 MINUTE REF D.S. EMAIL		CP 12/6/19	1	CP 12/6/19	
11.10.13	162	NDT TUBER					

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

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Item ID: D350-748-201

Accept

N9000040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00 *1*

Customer:

Reference:

Run Start *NR1*

Approvals: Process Plan: Date: Tooling: Date:

Stop *NR2*

QC: Date: SPC (Y/N): Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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180

0.00

180

SprayPaint

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside crosstube as per QSI 005 4.2
2-Paint Outside of Tube as per Dart QSI 005 4.2

190

QC14- Inspect Spray Paint

0.00

190

QC

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

200

0.00

200

Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Install Ground wire Insert, then insert screw and washer
2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035.
3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS

1 m 12-06-20

Q 12-06-22

AS 12-6-22

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Item ID: D350-748-201 Accept *N900040100* Setup Start *NS1*
 Revision ID: Stop *NS2*
 Item Name: Crosstube Installation, High Aft
 Start Date: 4/23/12 Start Qty: 1.00 *1* Cust Item ID:
 Required Date: 5/07/12 Req'd Qty: 1.00 *1* Customer:
 Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start *NR1*
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240	Packaging	0.00							
240									
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPPD350-748-201								
	Location: _____								
	PPP Rev: <u>B</u>								
250	QC21- Final Inspection - Work Order Release	0.00							
250									
QC	Memo	0.00							
Quality Control									

MLJ 12/06/26

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Picklist Print

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Page 1

Work Order ID: 83699

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

Comments:

IPP Rev: A New Issue 06-07-05 JLM
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F 10.08.04 added QSI010
 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-241TRN Crosstube Turning Detail		Manufactured	No			110	Each	2.0000	1	1			
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				LG	73375	2							
				61314		0							
				61315		0							
				79393		1							
				83287		1							
ALS4-1032-225 Insert		Purchased	No			200	Each	855.0000	1	1			
				<u>Location</u>	118520	<u>Loc Qty</u>		<u>Loc Code</u>					
				ST281		832							
				108696		146							
				110768		62							
				118386		55							
				118966		68							
				121269		501							
				ST282		23							
				120410		10							
				120451		13							
AN960JD10 Washer	NAS1149D0363J	Purchased	No		121524	200	Each	0.0000	1	1			

① JW 12-5-10

① AL 12-6-22

① AL 12-6-22

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Page 2

Work Order ID: 83699

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

D2856-400 Manufactured No

200 f 254.5445 1.181 1.2431579

Abrasion Strip

1- cut as per dwg D2856

Location	Loc Qty	Loc Code
ST403	216	
81875	216	
ST409	38.5445	
63735	0.6696	
68076	0.3149	
71164	8.46	
79551	29.1	

AB 12-6-22

D3502-1 Manufactured No

200 Each 21.0000 2 2

Support

77041

Location	Loc Qty	Loc Code
ST051	21	
73419	11	
74873	10	

AB 12-6-22

MS21920-20 Purchased No

200 Each 86.0000 2 2

Clamp (per MIL-DTL-8783C)

Location	Loc Qty	Loc Code
LG050	86	
116799	8	
120676	8	
121067	20	
121274	50	

AB 12-6-22

MS27039-1-10 Purchased No

200 Each 126.0000 1 1

Screw

122027

Location	Loc Qty	Loc Code
GA	100	
120449	100	
ST291	26	
120120	26	

AB 12-6-22

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Page 2

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Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

AN4-41A Purchased No 220 Each 539.0000 8 8 *sd*

Bolt

Location	Loc Qty	Loc Code
360	181	
121185	181	
ST360	358	
115108	3	
115705	7	
118451	29	
<u>118838</u>	50	8
119328	100	
120423	150	
121205	15	
121573	4	

AN4-6A Purchased No 220 Each 1,514.0000 16 16 *sd*

Bolt

Location	Loc Qty	Loc Code
355	222	
121631	222	
ST356	1292	
<u>119017</u>	792	16
121243	500	

AN5-32A Purchased No 220 Each 245.0000 4 4 *12-6-23*

Bolt

Location	Loc Qty	Loc Code
ST339	145	
119862	50	4
<u>120423</u>	75	
120910	20	
ST340	100	
121541	100	

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Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

AN960JD416 NAS1149D0463J Purchased No
Washer

220 Each 30.0000 32

32 M121912

Location	Loc Qty	Loc Code
ST351	30	
116289	10	
119097	20	

AN960JD516 NAS1149D0563J Purchased No
Washer

220 Each 0.0000 8

8 M119546 SD

D3500-1 Manufactured No
Saddle

220 Each 75.0000 4

4 SD

Location	Loc Qty	Loc Code
ST423	14	
78595	14	
ST424	31	
73405	20	
73406	8	
76000	3	
ST425	30	
76940	30	

D3501-1 Manufactured No
Bushing

220 Each 367.0000 16

16 B8544 SD

Location	Loc Qty	Loc Code
ST051	367	
67757	4	
73391	6	
74866	207	
77033	61	
81955	26	
83253	63	

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Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

MS21042L4 Purchased No

220 Each 4,226.0000 24 24

50

Nut

Location	Loc Qty	Loc Code
ST300	4226	
119075	125	
121011	844	
121444	2957	24
121652	300	

MS21042L5 Purchased No

220 Each 1,469.0000 4 4

12-6-250

Nut

Location	Loc Qty	Loc Code
300	500	
121652	500	
ST300	969	
108827	8	
116105	5	
116548	43	
117611	18	
119109	887	4
17651	8	

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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

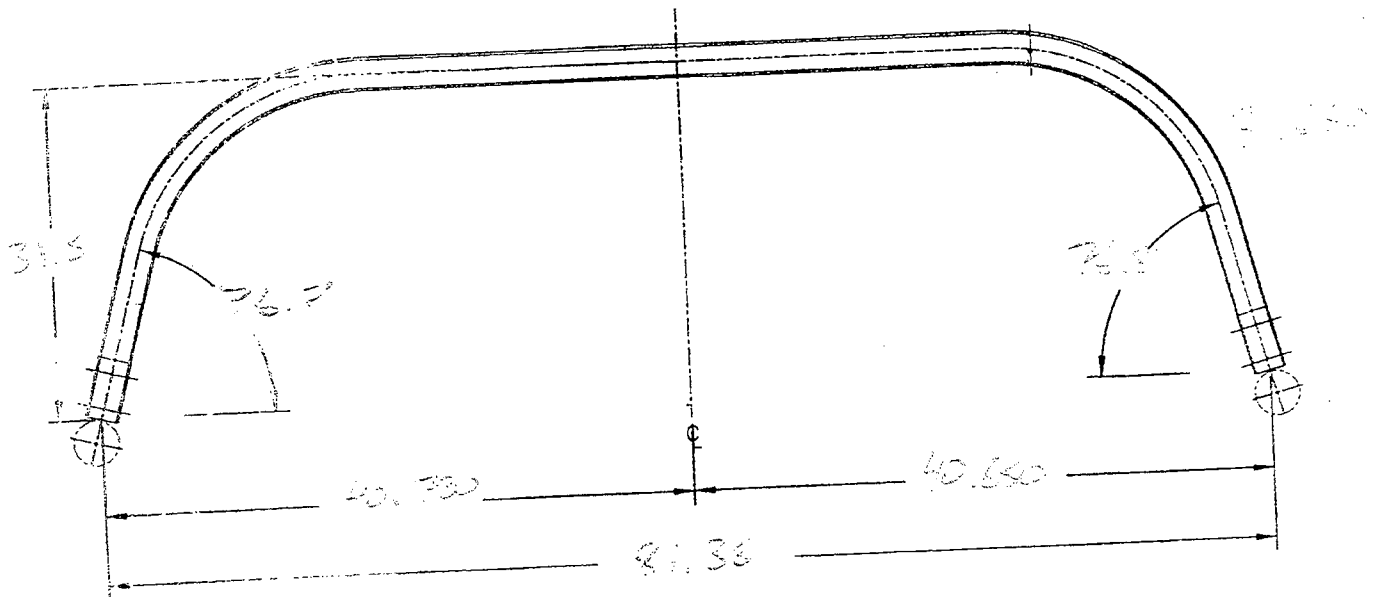
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DART AEROSPACE LTD		Work Order: 53699
Description: Crosstube High Aft (AS350/355)		Part Number: D350-748-201
Inspection Dwg: D350-748-241		Rev: E
		Page 1 of 1

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Twist = 0.000
Examine Spacing Points

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.03	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

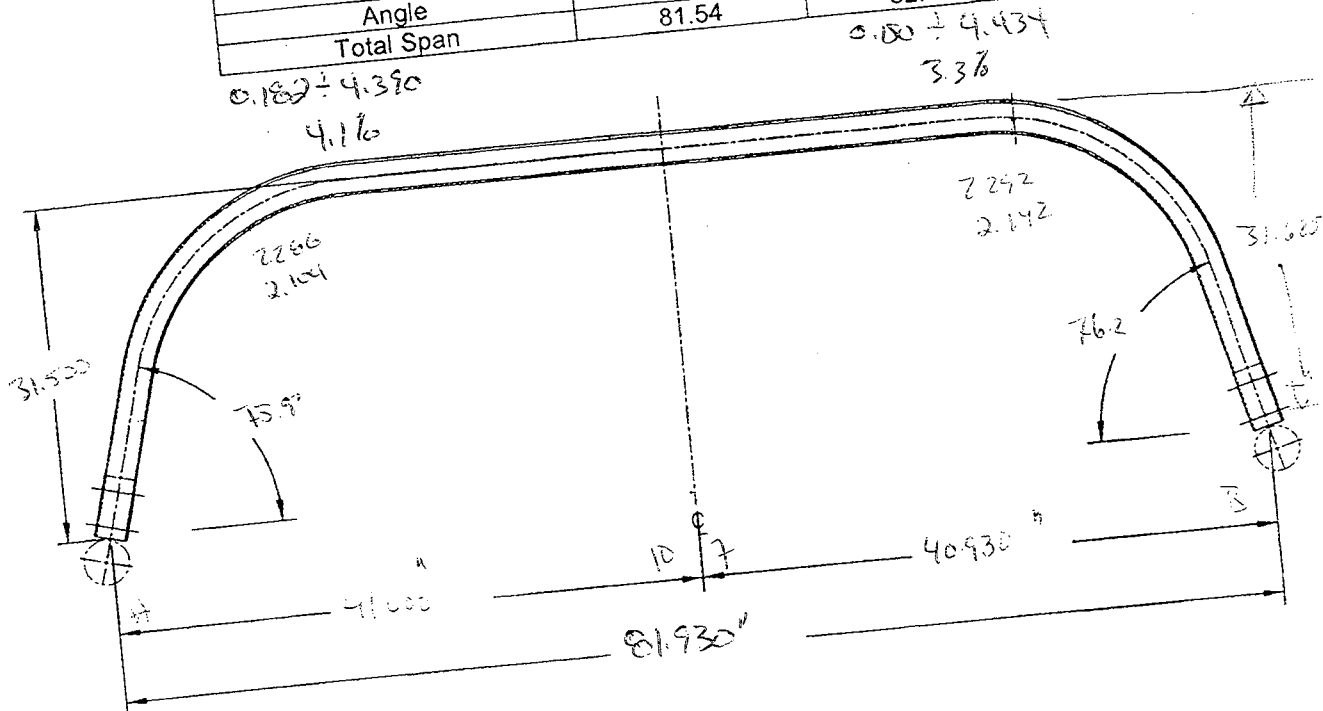
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order: 83699
Description: Crosstube High Aft (AS350/355)		Part Number: D350-748-201
Inspection Dwg: D350-748-241	Rev: E F. J. [Signature]	Page 1 of 1

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Side A = 4.1% crushing @ 10 passes
Side B = 3.3% crushing @ 7 passes
twist - 0.45"
tube is kinked

QC15 Inspection	6
Date	17/10/10

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	[Signature]

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

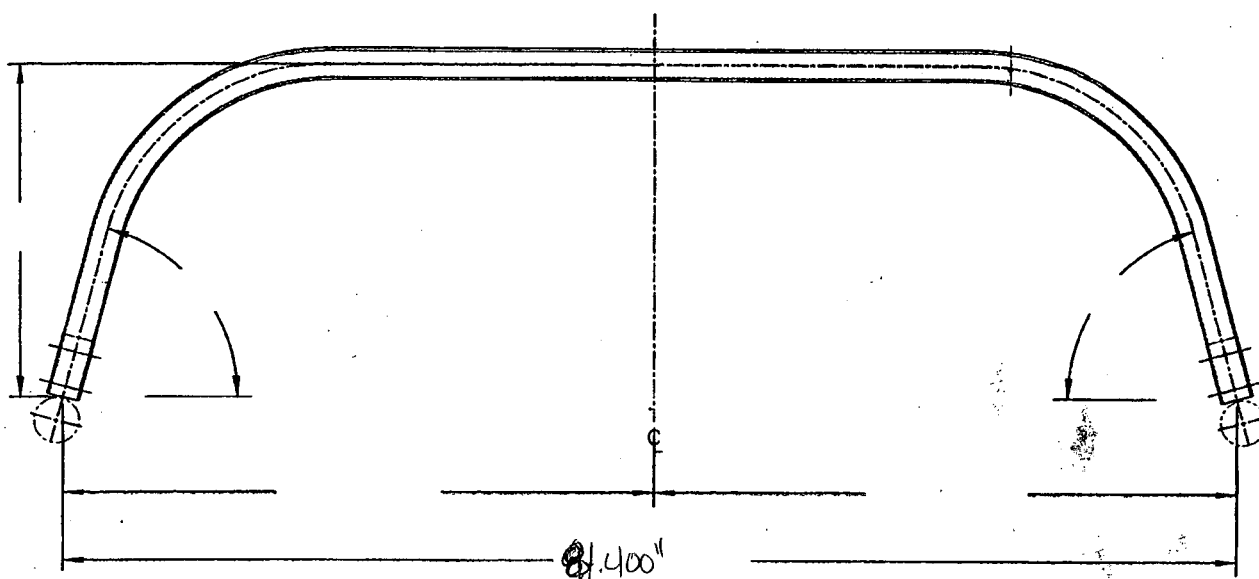
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
twist ~ 0.05"

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

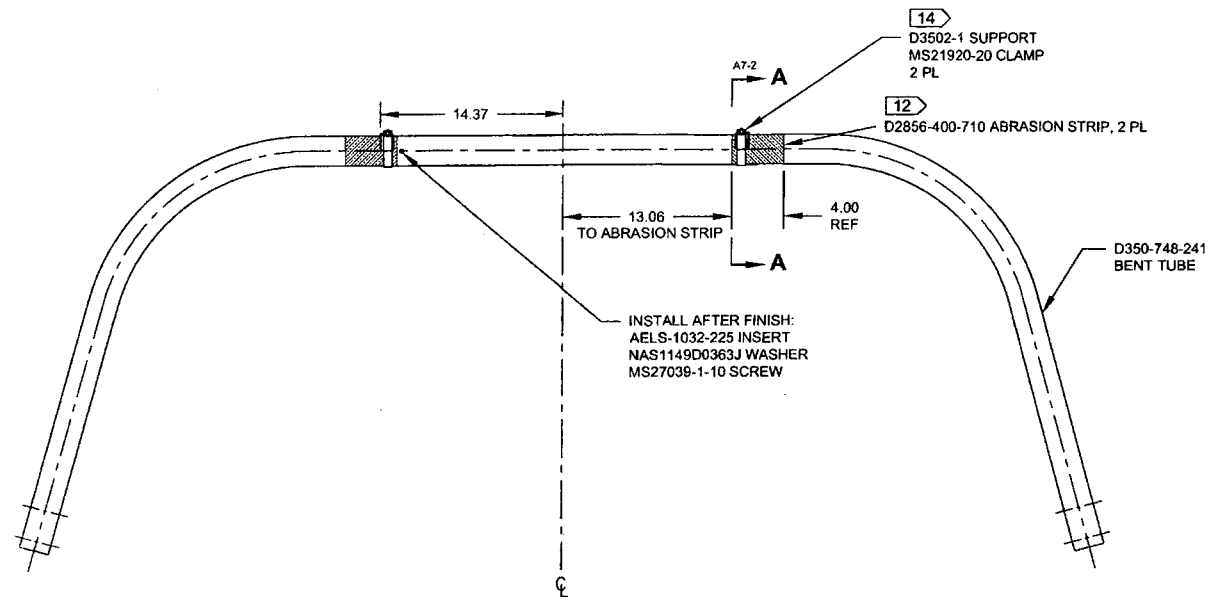
- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

CD 12/05/29
WIO: 83699

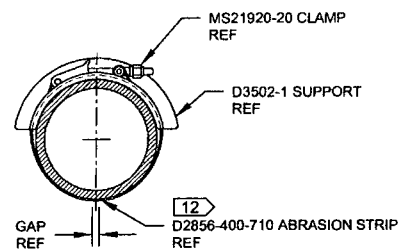
RELEASED
2011-01-08

F	ADD HRC TEST OPTION (B8-1) PER PAR 08-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (CB-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES: UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-241	REV. F SHEET 1 OF 4
TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS
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**D350-748-241
ASSEMBLY DETAIL**



SECTION A-A D4-2
SCALE 4X

RELEASED
2011-02-18
JAN

DESIGN	90	DART AEROSPACE LTD	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-241	SHEET 2 OF 4
APPROVED	14	TITLE	SCALE
DE APPR.	14	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRESENTED AND COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

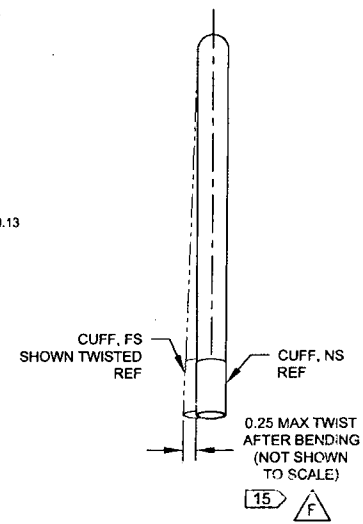
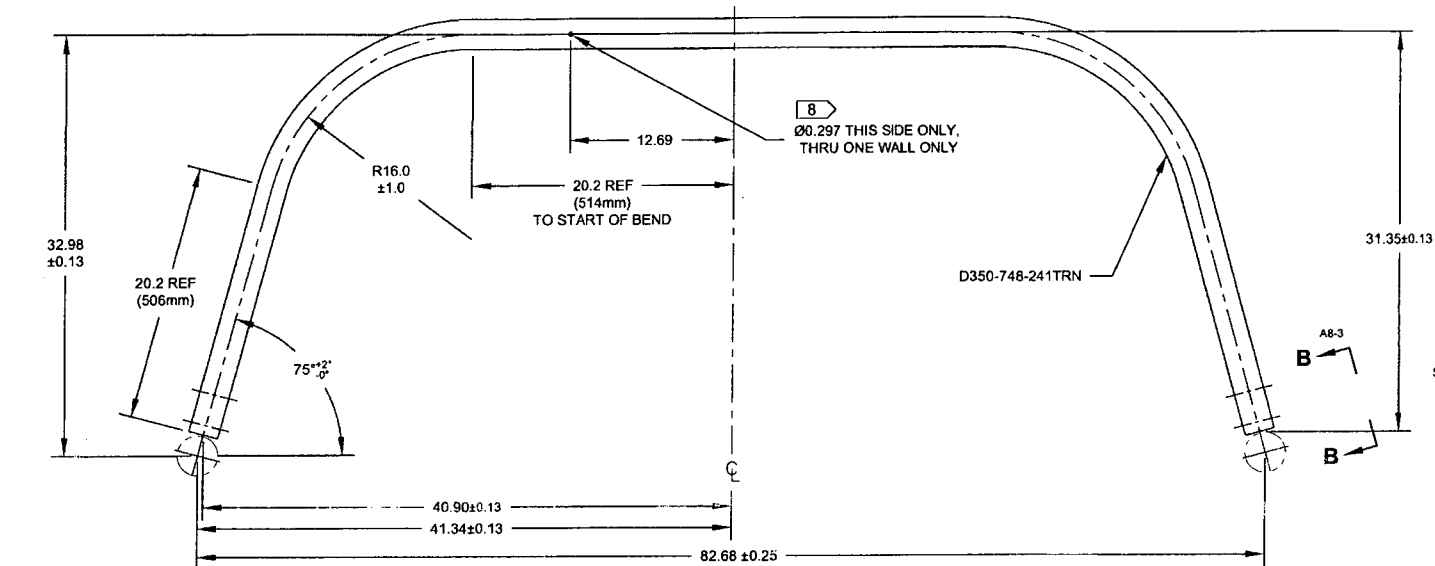
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D

C

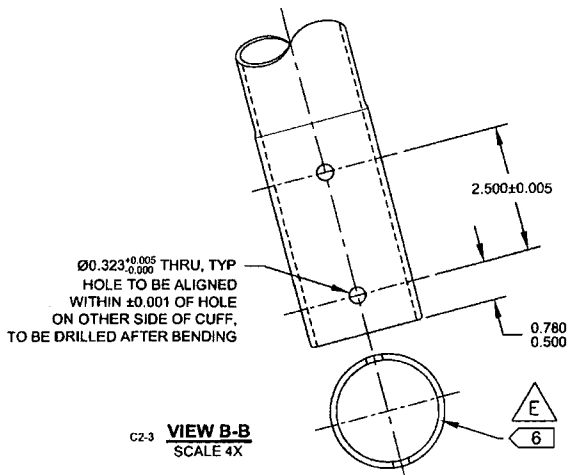
B

A



D350-748-241
BENDING AND DRILLING DETAIL 10

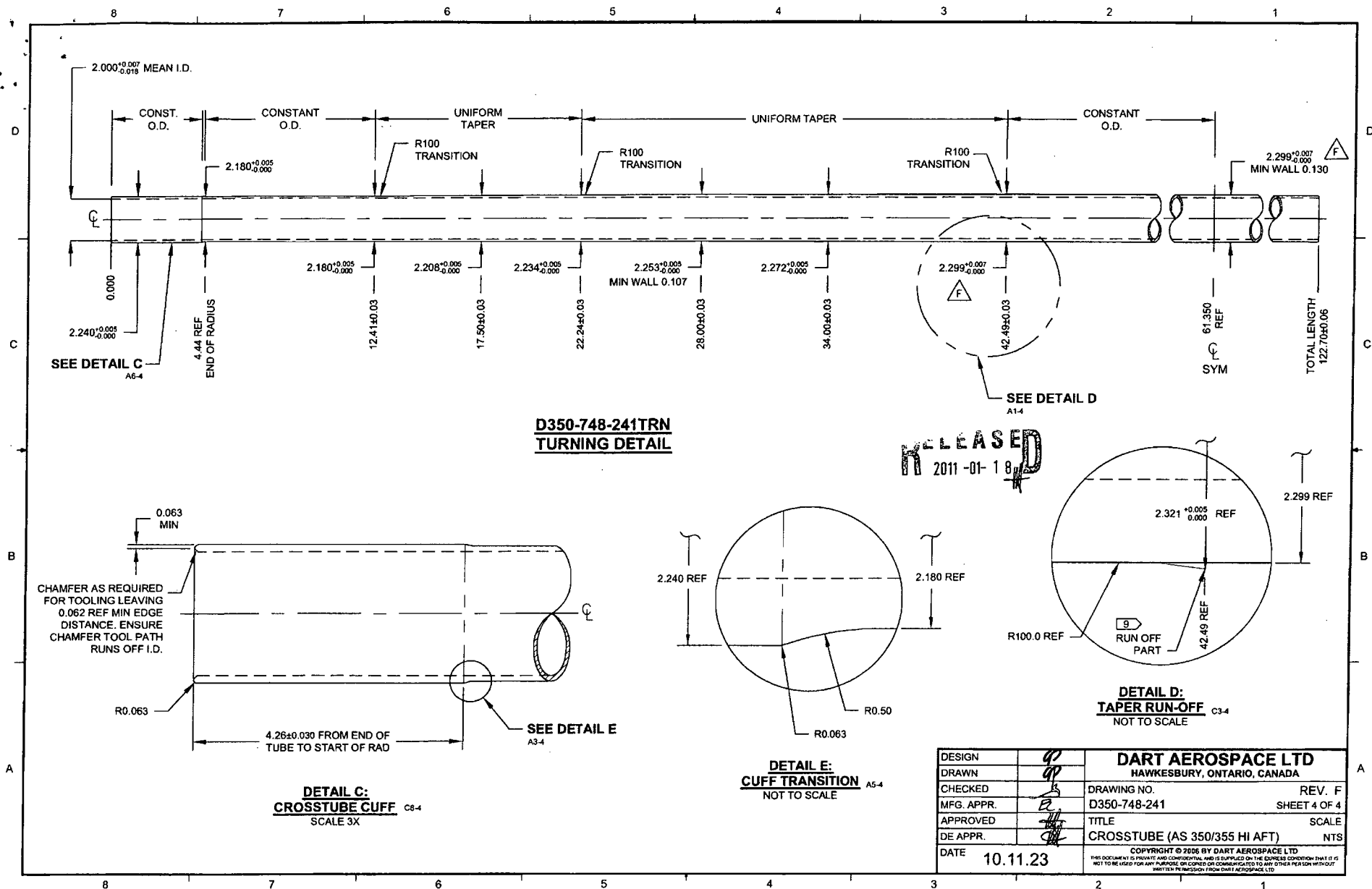
RELEASED
2011-01-18



C2-3 **VIEW B-B**
SCALE 4X

DESIGN	92	DART AEROSPACE LTD	
DRAWN	92	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-241	SHEET 3 OF 4
APPROVED	13	TITLE	SCALE
DE APPR.	13	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD</small>	

8 7 6 5 4 3 2 1



METCOR INC.
560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8
 Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé
 Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175881	1

CLIENT / customer 215
 DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:
 DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
16942		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
 processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement	SPÉCIFICATIONS / specified	TESTS EXÉCUTÉS / performed	RÉSULTATS DE TESTS / results
Visual			

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
	210	D350-748-101 (1) CROSSTUBE (1) D350-748-101 CROSSTUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE CONTENANT: 1 PALETTE

Operation	Temp. spécifiée Specified Temp	Temps de trempage Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1.00 LAVAGE CONT. INIT.			si nécessaire							

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ

ST-EUSTACHE, QC, J7R 5A8

Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175881	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

Operation	Temp. spécifiée Specified Temp	Temps de trempe Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
2,00 COMPTAGE PREPARING										
3,00 STRESS RE	650	2 hrs 30 minutes	air			701				
4,00 FINAL INSP							05-11-2012			05-11-2012

COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPEMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

APPROUVÉ par / Approved by:



MET
16

DATE: 2012-05-11

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client. / We certify that all the information on this report is exact and in accordance with the order requirements.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

**CERTIFICATE OF
CONFORMANCE**

CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1

DATE: Jun-12-2012

CONSIGNEE TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114960
INVOICE #: 60875

CONTRACT OR
PURCHASE ORDER # PO17084

DESCRIPTION: CROSSTUBE

P/N # D350-748-201

S/N # 83699

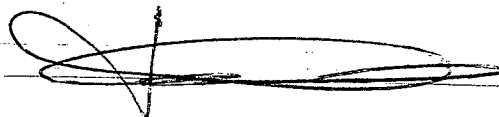
QTY 1

STRESS RELIEVE HEAT CHART # 12-546. MPI-IAW ASTM-E-1444.
CADMIUM PLATE IAW AMS-QQP-416C TYPE 2 YELLOW CLASS.
BAKE HEAT CHART # 12-573. MPI IAW ASTM-E1444.

S. 12/16/15

**CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.**

Approved Inspector:





LIQUID PENETRANT TEST REPORT

P- 12188

PAGE 1 OF 1

CLIENT DART Aerospace
ATTENTION MATT/LINDA
ADDRESS 1270 ABERDEEN ST.
HAWKESBURY, ON

DATE June 19/2012 TIME AM ☒ PM ☐
ACUREN JOB NO. 198-12-0265
PO/NO. 17084
WORK LOCATION SAUE
ACCEPTANCE STD. ASTM 1417/651038 REV./DATE 2005

PROJECT F.P.I. on cross tubes
ITEM(S) EXAMINED (6) Pcs SEE RESULTS

JOB DESCRIPTION SEE RESULTS PROCEDURE NO. LT002 REV./DATE 2008 TECHNIQUE NO. LT002 REV./DATE 2008
MATERIAL 4130 STEEL THICKNESS VARIOUS
SCOPE WET FLUORESCENT LIQUID PENETRANT EXAMINATION
WAS COMPLETED 100% ON EXTERNAL SURFACE

TEST DETAILS		<input checked="" type="checkbox"/> FLUORESCENT <input type="checkbox"/> VISIBLE		<input checked="" type="checkbox"/> WATER WASH <input type="checkbox"/> SOLVENT REMOVABLE <input type="checkbox"/> POST EMULFIER	
METHOD <u>MAGNAFLUX</u>		<input type="checkbox"/> BLACK LIGHT S/N <u>1647</u> OUTPUT > 1000 μ W/cm ²		<input type="checkbox"/> AMBIENT < 2 °C	
FAMILY BRAND <u>2407</u>		LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT		OUTPUT > 100 fc @ SURF.	
PENETRANT <u>H2O</u>		OTHER <u>LAB. NO.</u>		CAL DUE DATE <u>July 20-2012</u>	
PENETRANT REMOVER <u>SKD 52</u>		LIGHT METER S/N <u>1098866</u>			
DEVELOPER <u>SKD 52</u>		MINIMUM DWELL TIME <u>10</u> MIN.			
DEVELOPER TYPE <input checked="" type="checkbox"/> NON AQUEOUS <input type="checkbox"/> AQUEOUS <input type="checkbox"/> DRY					
TEST SURFACE		<input type="checkbox"/> AS WELDED <input checked="" type="checkbox"/> MACHINED <input type="checkbox"/> SHOT BLASTED		<input checked="" type="checkbox"/> CLEAN BARE METAL	
SURFACE CONDITION <input type="checkbox"/> AS GROUND <input type="checkbox"/> AS WELDED		<input type="checkbox"/> 10°C/50°F TO 52°C/125°F		<input type="checkbox"/> > 52°C/125°F	
SURFACE TEMPERATURE <input type="checkbox"/> < -4°C/ 20°F <input type="checkbox"/> -4°C/ 20°F TO 10°C/50°F					
RESULTS- <input checked="" type="checkbox"/> METRIC <input type="checkbox"/> IMPERIAL					

W.O.#s - CROSS TUBES.			
1	-	83701	✓
1	-	83699	✓
1	-	83698	✓
1	-	81517	✓
1	-	81518	✓
1	-	84380	✓

12.06.19

Scope of Services
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacturing, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, express or implied, is made or intended by Acuren Group Inc.

SIGNATURES		DTR # <u>E 6350</u>	
CLIENT REPRESENTATIVE <u>Matthew Murdoch</u>	PRINT	SIGNATURE	
TECHNICIAN (SIGNATURE): <u>Mike Littman</u>	1 ST TECHNICIAN	REPORT REVIEWED BY: _____	
NAME (PRINT): <u>Mike Littman</u>	CGSB LEVEL <u>1</u> SNT LEVEL _____	NAME	
CGSB REG. NO. <u>60666</u>	CGSB REG. NO. _____		